Catalyst Measurement

Version 2017-05-08

Color Coding Legend				
Data Entry Cell	Calculated Cell	Percent Difference	Area of Concern	Instrument Calibration Out of Range

Engine Family	HHSNX.196A21
VIN/Serial No.	LWGPCML26HA094286
Task Directive	TD 2, Opt. 2
Entry Number	9AR-02898633
Inspection Number	20180217-1550-01
Catalyst Inspection Date	2/17/2018
Certificate Catalyst Manufacturer	Chongqing Jisan Environmental Protection
Certificate Catalyst Part Number	CQJS-BGF13E3
Observed Catalyst Markings	"CQJS-BG…"; "1710…" (Markings obscured by weld)

Daily Calibration Results

Instrument Used	Mitutoyo Calipers (SN: 04427304)
Date of Last Simco Calibration (must be < 1 year)	5/11/2017

	End Rod Result	Accuracy (mm)
25 mm End Rod	24.99	0.01
50 mm End Rod	49.99	0.01
75 mm End Rod	74.99	0.01

	1st Measured Value (mm)	2nd Measured Value (mm)	3rd Measured Value (mm)	4th Measured Value (mm)	Calculated Average Value (mm)	Percent Difference	Certificate Values
Diameter: outside of exhaust piping	32.19	32.16	32.21	32.23	32.20	[redacted]	
Diameter: outside of catalyst casing	Not Measurable	Not Measurable	Not Measurable	Not Measurable	--	--	Not Reported
Diameter: inside of catalyst casing (catalyst diameter)	30.03	30.01	29.99	30.02	30.01	[redacted]	
Length: exhaust piping	35.02	35.00	34.97	34.98	34.99	[redacted]	
Length: catalyst casing	Not Measurable	Not Measurable	Not Measurable	Not Measurable	--	[redacted]	
Length: catalyst material	Not Directly Measured	Not Directly Measured	Not Directly Measured	Not Directly Measured	34.99	[redacted]	
Inset: catalyst casing (side 1)	Not Measurable	Not Measurable	Not Measurable	Not Measurable	--	[redacted]	
Inset: catalyst casing (side 2)	Not Measurable	Not Measurable	Not Measurable	Not Measurable	--	[redacted]	
Inset: catalyst substrate (side 1)	0.00	0.00	0.00	0.00	0.00	[redacted]	
Inset: catalyst substrate (side 2)	0.00	0.00	0.00	0.00	0.00	[redacted]	

Counted cells (total)	324	volume cc	24.76
Avg. inside diameter of casing (in)	1.18	cells/in^2	295.47

Comments	None
Areas of Concern	None
Photo Used for Counts	DSCN8193 - Cell Count.JPG
Inspector:	Aasim Rawoot
ERG Reviewer:	Brent Ruminski
Report Date:	2/22/2018

Honeycomb Catalyst Precious Metals Analysis

Version 2017-05-08

Legend			
Data Entry Cell	Result Calculation	Instrument Calibration Out of	LOD - limit of detection

Engine Family	HHSNX.196A21
VIN/Serial No.	LWGPCML26HA094286
Task Directive	TD 2, Opt. 2
Entry Number	9AR-02898633
Inspection Number	20180217-1550-02
Catalyst Inspection Date	2/19/2018
Certificate Catalyst Manufacturer	Chongqing Jisan Environmental Protection Technology Co., Ltd.
Certificate Catalyst Part Number	CQJS-BGF13E3
Observed Catalyst Markings	"CQJS-BG..."; "1710..." (Markings obscured by weld)

Instrument Used	X-5000 (S/N: 202212)
Calibration Curve Name	Metallic Curve 2016-01-19
Check Standard ID	Ledoux-11

Daily Check Standard Results

	Measured Value (% concentration)	Measured Value (ppm)	Known Concentration Value (ppm)	Percent Difference (Measured vs. Known Value)	Control Charting Checks
Pt	0.228	2,283	2,021	12.96%	OK
Pd	1.278	12,781	12,474	2.46%	OK
Rh	0.127	1,272	1,192	6.71%	OK

Measured Precious Metals Concentrations with X5000

	Measured Value (% concentration, by weight)	x-5000 LOD (% Concentration by weight)	Measured Value (ppm)	x-5000 LOD (ppm)
Pt	<LOD	0.0295	<LOD	295
Pd	1.1778	0.0134	11,778	134
Rh	0.1313	0.0028	1,313	28
Ce	35.1000	0.4100	351,000	4,100
Zr	12.4200	0.1300	124,200	1,300

Certified Precious Metals Data

	Reported Cert Ratio	Reported Cert Loading Value	Reported Cert Loading Value Units	Calculated Cert. Loading Value (g/L)	Calculated Ratio from Measurement	Cert Ratio	Difference (%) (Measured Vs. Certified
Pt						0.0	
Pd							
Rh							
Total:			g/ft^3				

Material Weight Reconciliation

Pre-Extraction/Separation Weights (g)		Post-Extraction/Separation Weights (g)		Mass Balance Calculations Weights (g)		Percent Losses
Weight of Catalyst	59.28	Post Extraction: Weight of Catalyst	51.99	Theoretical PM and Ferrous Metals	7.29	
Empty Glass Vial (w/ lid)	58.16	Post Extraction: Glass Vial (w/ lid, PM, and ferrous metals)	65.29	Extracted PM and Ferrous Metals	7.13	
Empty Glass Vial (w/ lid)	58.16	Post Separation: Glass Vial (w/ lid and ferrous metal only)	64.39	Extracted Ferrous Metals	6.23	
Empty Sample Cup (no lid, no Mylar)	4.21	Sample Cup with PM (no lid or Mylar)	5.10	Extracted PM Sample	0.89	
				Total Material Lost	0.17	2.33%

Drilling Information

Hole 1

	1st Measured Value (inches)	1st Measured Value (inches)	3rd Measured Value (inches)	4th Measured Value (inches)	Calculated Average Value (inches)
Hole Diameter Side 1	0.3920	0.3990	0.3880	0.3870	0.3915
Hole Diameter Side 2	0.3895	0.3630	0.3975	0.3870	0.3843
Drill Bit Diameter (in.)	3/8				

Hole 2

	1st Measured Value (inches)	1st Measured Value (inches)	3rd Measured Value (inches)	4th Measured Value (inches)	Calculated Average Value (inches)
Hole Diameter Side 1	0.4145	0.3910	0.4280	0.3840	0.4044
Hole Diameter Side 2	0.4690	0.3850	0.4300	0.3770	0.4153
Drill Bit Diameter (in.)	3/8				

Hole 3

	1st Measured Value (inches)	1st Measured Value (inches)	3rd Measured Value (inches)	4th Measured Value (inches)	Calculated Average Value (inches)
Hole Diameter Side 1	0.4075	0.4035	0.4010	0.3890	0.4003
Hole Diameter Side 2	0.4785	0.3980	0.3880	0.3875	0.4130
Drill Bit Diameter (in.)	3/8				

Loading Results

	Calculated Extracted Powder Weight		Cert Value - Loading (g/L)	Calculated Metals Loading		Percent D Loadin
	Result (g)	LOD (+/- g)		Result (g/L)	LOD (+/- g/L)	Result (%)
Pt	<LOD	+/- 0.00026		<LOD	+/- 0.031	N/A
Pd	0.01048	+/- 0.00012		1.222	+/- 0.014	
Rh	0.00117	+/- 0.00002		0.136	+/- 0.003	
Total	**0.01165**	**+/- 0.0004**		**1.358**	**+/- 0.047**	

Test Conditions	3 runs, 90 seconds each
Check Standards	The check standard results passed all daily control charting checks.
Comments:	None
Pt Qualifiers	The measured concentration of Pt in the compliance sample was below the X-5000 LOD.
Pd Qualifiers	None
Rh Qualifiers	None
Ratios:	The calculated ratio for Pt : Pd : Rh was 0 : 9 : 1 and the
Pt Loading:	The Pt loading cannot be calculated because the Pt concentration was below the X-5000 LOD.
Pd Loading:	The calculated Pd loadings were zero.
Rh Loading:	The calculated Rh loading was than the certified value.
Total Loading:	The calculated total loading was than the certified value.
Areas of Concern	None
Related Photo(s)	DSCN8283.JPG - DSCN8291.JPG
Inspector(s):	Aasim Rawoot
ERG Reviewer:	Brent Ruminski
Report Date:	2/22/2018

Photograph of Catalyst Part Number

Cell Count Photo

Drilled Hole Photo